R22 Regulation *Subject code:4E6BB*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A+' Grade)

B.Tech VI Semester Regular/Supplementary Examinations, April 2026

POWER SYSTEM OPERATION AND CONTROL

(EEE)

Maximum Marks: 60 Date:16.04.2026 Duration: 3 hours

Note: **1.This question paper contains two parts A and B.**
2. Part A is compulsory which carries 10 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks (10X1M=10 Marks)		Marks	CO	Bloom Tx
1.a)	Write the significance of power flow studies?	1M	1	2
b)	What is nodal admittance matrix?	1M	1	1
c)	List out the limitations of equal area criterion.	1M	2	2
d)	Mention the various factors that affect the steady state stability of a power system.	1M	2	2
e)	What is meant by load frequency control?	1M	3	1
f)	What is the necessity of keeping frequency constant in power system	1M	3	2
g)	Mention the specifications of load compensator.	1M	4	1
h)	State the objective of reactive power compensation?	1M	4	1
i)	What is mean by state estimation.	1M	5	2
j)	What is the function of system monitoring?	1M	5	1

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	Bloom Tx
2	a) Define load flow problem. Classify the buses in power system and discuss the important of each bus.	5M	1	2
	b) Describe the Newton Raphson method for the solution of power flow equations in power systems by deriving necessary equations.	5M	1	3
	OR			
3	a) Write an algorithm for computational procedure for load flow solution using Gauss-Seidel method when the system contains all types of buses.	5M	1	3
	b) What is the effect of acceleration factor in the load flow solution algorithm?	5M	1	2
4	a) Explain clearly the application of equal area criterion for studying the transient stability of a system.	5M	2	2
	b) A 50Hz generator of reactance 1pu is connected to an infinite bus through a line of reactance of 0.5pu. E=1.1pu and V=1pu. The inertia constant is 5MW-sec/MVA. The generator is loaded to 50% of the maximum power limit. Find the frequency of natural oscillations.	5M	2	3

	OR			
5	a) Define power system stability and classify different types of stability. b) Obtain the solution for swing equation using step-by-step method.	5M 5M	2 2	2 3
6	a) Distinguish between Load Frequency control and Economic dispatch control. b) Draw and explain the block diagram of single area load frequency control system.	5M 5M	3 3	4 2
	OR			
7	Discuss clearly about proportional plus integral load frequency control with a block diagram.	10M	3	2
8	a) Explain clearly what do you mean by compensation of line and discuss briefly different methods of compensation. b) Write short notes on compensated and uncompensated transmission lines.	5M 5M	4 4	2 2
	OR			
9	a) Explain the applications of load compensation. b) With neat diagram, describe shunt compensation in transmission lines.	5M 5M	4	3
10	a) Explain in detail the need for computer control of power systems. b) Describe the Energy Control Centre (ECC) and its functions.	5M 5M	5 5	2 2
	OR			
11	a) Illustrate SCADA system architecture and explain its functions. b) Explain the role of energy management system in control of power system.	5M 5M	5 5	4 4